

REMARKS

A request for continued examination and an accompanying submission were filed on August 29, 2007. Claims 1-114 are now pending.

Claims 1-114 are rejected as allegedly obvious under 35 U.S.C. § 103(a). For the following reasons, Applicants traverse the rejections and submit that claims 1-114 are in condition for allowance.

I. Rejections under 35 U.S.C. § 103

Claims 1-11, 55-64, 66, 68-77 and 111-114 stand rejected under 35 U.S.C. § 103 as allegedly being unpatentable over U.S. Pat. App. No. 2004/0209354 to Mathies *et al.*, (“the Mathies application”) in view of U.S. Pat. App. No. 2004/0037739 to McNeely *et al.* (“the McNeely application”) and Quake (U.S. Pat. 6,833,242). Applicants respectfully submit that because the Office Action does not set forth the basic requirements of a *prima facie* case of obviousness as required by MPEP § 2143, the rejections are improper.

A. Legal Standard

To establish a *prima facie* case of obviousness, there must be a clearly articulated reason or rationale, either in the prior art itself or in the knowledge generally available to one of ordinary skill in the art, why the claimed invention is obvious in light of a reference or combined reference teachings. MPEP §§ 2143, 2143.01; *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1739-43 (2007), 82 USPQ2d 1385, 1395-97. There must also be a reasonable expectation of success. MPEP § 2143.02. Further, the prior art combination must address all of the elements of the claim at issue. MPEP § 2143.03. The rationale to make the claimed combination and the reasonable expectation of success must be found in the prior art and not be based on applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 493 (Fed. Cir. 1991).

B. Discussion

The Office Action acknowledges that the combination of the Mathies and McNeely references fails to disclose Applicants’ claimed invention. (Office Action at 5.) Applicants submit that the additional inclusion of the Quake reference does not cure the deficiencies of the Mathies and McNeely references.

The claimed invention is directed toward concentrating and labeling target molecules and then immobilizing those targets at complementary spots disposed on a microarray, where the bound and labeled targets are then analyzed. (Application at, *e.g.*, [0072], [0087], and **FIG. 9.**) As set forth below and in the attached declaration submitted under 37 C.F.R. § 1.132, however, the combination of the Mathies, McNeely, and Quake references is improper under the MPEP and does not disclose or otherwise contemplate Applicants' claimed invention.

1. The Combination Of The Mathies, McNeely, and Quake References Is Improper Under The MPEP and Can Not Support a *Prima Facie* Case of Obviousness

Because the Mathies, McNeely, and Quake references function in different ways, their combination would change the references' principles of operation. But the MPEP makes clear that combining references in a way that changes their mode of operation can support a *prima facie* case of obviousness.

As an initial matter, Applicants submit that the Mathies and Quake references are non-analogous art and would not lead one of ordinary skill in the art to the claimed invention. As discussed in further detail below, the Mathies* and Quake references are directed toward analyzing *moving* target molecules as those molecules *move* past a point. But because the claimed invention discloses analyzing molecules that are *bound* to target probes (*e.g.*, Application at [0053]), these references would not be used by one of ordinary skill in the art to arrive at the claimed invention.

Further, the MPEP makes clear that the proposed combination of references can not support a *prima facie* claim of obviousness against the claimed invention. As the MPEP states, “[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references *are not sufficient to render the claims prima facie obvious.*” MPEP § 2143.01.VI

* Applicants respectfully note that the Mathies reference does not disclose or otherwise contemplate microarrays, and respectfully suggest that the statement “Mathies and McNeely are analogous art because they are from the same field of endeavor regarding microfabricated chips *that comprise microarrays*” (emphasis added) at page 4 of the Office Action mischaracterizes the Mathies reference.

(emphasis added) (citing *In re Ratti*, 270 F.2d 810 (CCPA 1959)). The proposed combination of the Mathies, McNeely, and Quake references, however, would change the references' principle of operation.

The Mathies reference discusses (e.g., at paragraph [0079] and **FIG. 13**) electrophoretic analysis of target molecules, which is a dynamic process that discriminates between target molecules on the basis of their **mobility**. The Quake reference similarly contemplates dynamic analysis of moving molecules. This is made clear at Quake reference **col. 27, lines 6-10** ("in a preferred embodiment, the molecules or cells are analyzed and/or separated [] *as they pass through a detection window or "detection region"* in the device) (emphasis added); **col. 27, lines 62-63** ("molecules or cells *are sorted dynamically in a flow stream* of microscopic dimensions") (emphasis added), and **FIGS. 11A and 11B** (showing flow path of target molecules past detection window).

The McNeely reference, however, is directed toward **immobilization** of target molecules by binding or affixing such targets to complementary molecules residing on a surface and analyzing the immobilized targets. This is made clear, *inter alia*, by the McNeely reference's **abstract** (describing "[a] method and system for providing a fluidic interface to slides bearing microarrays of biomolecules [] **immobilized thereon**") (emphasis added), by McNeely paragraph [0153] (disclosing "a binding solution containing a molecules (or molecules) that **binds selectively** to molecules of interest on [a] microarray") (emphasis added); and by McNeely **claim 20** (claiming "[a]n interface device for interfacing to the surface of a substrate bearing biological samples **immobilized** on a first surface") (emphasis added). Thus, while the McNeely reference contemplates analyzing molecules that are **immobilized** and **bound** to a surface, the Mathies and Quake references are directed instead toward analyzing target molecules based on their **movement**. Because combining references in a way that changes their principles of operation is impermissible and does not support a *prima facie* claim of obviousness, the combination of the Mathies, McNeely, and Quake references is improper and can not support a *prima facie* case of obviousness. *See* MPEP § 2143.01.VI ("[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the

references *are not sufficient to render the claims prima facie obvious*") (emphasis added); *In re Ratti*, 270 F.2d 810 (CCPA 1959).

2. The Combination Of The McNeely and Quake References Is Improper Because The McNeely Reference Teaches Away From The Claimed Invention and Also From Combination With The Quake Reference

Applicants submit that the combination of the three cited references is improper under because the references teach away from their combination and teach away from the claimed invention. MPEP § 2145.X.D.2. Accordingly, the cited references can not support an obviousness rejection of the instant claims.

Claim 1 of the present invention, upon which all other claims depend, recites:

“A microfluidic chip, comprising:

...
a microarray capable of being in fluid communication with said functionalized porous polymer monolith, the microarray situated within at least one microchannel, **the microchannel being characterized as having depth in the range of from about 1 micron to less than 10 microns**; . . . (Emphasis added.)

First, the McNeely reference teaches away from the claimed invention. As set forth in MPEP § 2145.X.D.1, “[a] prior art reference that ‘teaches away’ from the claimed invention is a *significant factor* to be considered in determining obviousness.” (Emphasis added.) Paragraph [0084] of the McNeely reference describes an invention having channels with a depth of “*at least about 15 microns*.” This description, however, teaches away from Applicants’ claim 1, which recites microchannels having a depth “*of from about 1 micron to less than 10 microns*.” Accordingly, McNeely reference’s explicit teaching away from the claimed invention demonstrates the nonobviousness of the claimed invention. MPEP § 2145.X.D.1.

Furthermore, because the McNeely reference cautions against its combination with the Quake reference, the combination of these references is improper. As set forth in the MPEP, “[i]t is improper to combine references where the references teach away from their combination.” MPEP § 2145.X.D.2 (citing *In re Grasselli*, 713 F.2d 731 (Fed. Cir. 1983)). At paragraph [0084], the McNeely reference states that the flow chamber of that invention should have a depth of “*at least about 15 microns*.” (Emphasis added.) Paragraph [0084]

also states, however, that “*reducing the chamber heights causes problems if the height goes below about a certain height.*” (Emphasis added.) By contrast, the Quake reference teaches flow channels having “preferred channel dimensions ranging from [] about 2 to about 4 or 5 microns in depth.” (Quake reference at **col. 24, lines 47-49**) (emphasis added).

Accordingly, by explicitly cautioning against the use of channels less than 15 microns in depth, the McNeely reference teaches directly away from combination with the Quake reference, and their combination is therefore improper. MPEP § 2145.X.D.2.

In sum, because the McNeely reference **teaches away** from both the claimed invention **and** from combination with the Quake reference, the combination of the cited references is improper under MPEP § 2145.X.D and can not support a *prima facie* case of obviousness against claim 1.

3. The Claimed Invention Produces Unexpected Results That Evidence Its Nonobviousness

Applicants submit that Office Action has failed to establish a *prima facie* case of obviousness. But even if the Office Action had established a *prima facie* case of obviousness – and Applicants do not concede this – the unexpected results that the claimed invention provides are further evidence of the invention’s nonobviousness and would overcome any such *prima facie* case.

As set forth in the MPEP, a *prima facie* case of obviousness may be overcome by evidence that claimed invention has, *inter alia*, achieved commercial success or yielded unexpected results. *See* MPEP § 2154 (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966)). The Patent Office is obligated to consider any such evidence that an applicant offers. *Id.*

As set forth in the attached declaration by Jason A.A. West, Ph.D. and the exhibits attached thereto, all submitted pursuant to 37 C.F.R. § 1.132, the claimed invention performs in a way that is unexpectedly superior to existing alternatives. In light of these unexpected results, Applicants submit that the claimed invention is nonobvious over the cited prior art. *See* MPEP § 2145.

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For these reasons, Applicants request that the rejection of claim 1 for alleged obviousness be withdrawn. Further, because any claim depending from an independent claim nonobvious under 35 U.S.C. 103(a) is itself nonobvious, Applicants submit that the obviousness rejections of all claims that depend from claim 1 should also be withdrawn. *In re Fine*, 837 F.2d 1071, 1076 (Fed. Cir. 1988).

II. CONCLUSION

For all of the foregoing reasons, Applicants submit that the rejections of the pending claims under 35 U.S.C. 103(a) are improper in light of the cited prior art and should be withdrawn. Accordingly, Applicants respectfully request that the Examiner (1) reconsider and withdraw the pending rejections, and (2) pass the pending claims to allowance.

Applicants respectfully submit that in light of the amended claims, the present application is in condition for allowance. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided. Favorable consideration and an early notice of allowance are respectfully requested.

Respectfully submitted,

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